CO GUARDIAN

OWNERS MANUAL

CARBON MONOXIDE DETECTOR MODELS
Panel mount and Remote Detectors (R)
(353 and 353R)

LOG OF REVISIONS

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FORWARD

This document provides information intended for use by persons who, pursuant to current requirements, are qualified to install this equipment. Because equipment and system installations vary depending on a particular aircraft, this document is intended only as a guideline.

We welcome your comments concerning this document. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the document number, the paragraph/figure/table number, and the page number. Send your comments to the address above.

This unit is designed to be installed in Experimental Aircraft. If this unit is installed in a certified aircraft, appropriate FAA approval is required prior to installation.

1.0 GENERAL

This section gives a physical and functional description of the CO Guardian CO Detector indicator as installed in a typical reciprocating engine type aircraft.

2.0 PHYSICAL DESCRIPTION (all models)

Remote mounted CO Detector part numbers are listed in Table 1.

PART NUMBER	Description	SERVICE LIFE	POWER Volts	Cabin Pressure warning (10K, 12.5K and 14K	DATA BUSS (RS232)
353	Panel mount Detector	5 years	14/28	yes	yes
353R	Remote mount Detector	5 years	14/28	yes	yes

TABLE 1 - Part Numbers

The Detector must be returned to CO Guardian at the end of Service Life for replacement and calibration of the CO sensor to maintain airworthiness of the unit.

NOTE: The main reason for replacement of the sensor is the degradation of the sensor and dirt accumulation over the years. The replacement will be turned within two business days. See www.coguardian.com for exact procedures.

3.0 LEADING PARTICULARS

Table 2 lists the CO Detector leading particulars and below are specs.

LEADING PARTICULARS/SPECS

PARAMETER	SPECIFICATION
PHYSICAL	
Dimensions (approximate)	3.75” long. X 1.50”W in x 1.20” H
Weight (actual)	4.0 oz.
ENVIRONMENTAL	
Cooling	Passive
Temperature and Altitude	
Temperature	
Non-operating high temperature	+85 °C
Non-operating low temperature	-55 °C
Operating high temperature	+55 °C
Operating low temperature	-20 °C
Temperature Variation	
Altitude	25,000’ for 353P and 353PR
Humidity	95%
POWER REQUIREMENTS	
Power – 14/28 VDC Models	Nominal 9.0 vdc to 30.3vdc
Dissipation (maximum)	<1 watt

TABLE 2 - Leading Particulars

4.0 SCOPE (all models)

The Model 353 family of Carbon Monoxide Detectors are designed to detect, measure, and provide a visual alert to the crew of Reciprocating Engine type aircraft before the cockpit level of carbon monoxide (CO) reaches a critical level.

The installation consists of a single carbon monoxide detector indicator operating on aircraft DC power (14v or 28v). The aircraft supplied power and aircraft wiring is protected by a 2 ampere, resettable, trip free, type circuit breaker. The Carbon Monoxide Detector recommended location is behind the existing aircraft instrument panel.

The CO Detector installation consists of the CO Detector, a Test/Reset button, and a required amber ALERT annunciator light mounted on the cockpit instrument panel.

The carbon monoxide alarm level is calibrated to provide a visual alert within 5 minutes or less whenever the carbon monoxide level reaches 50 parts per million (PPM) by volume or greater. The warning time is shortened at higher levels of CO concentrations and becomes approximately instant should the carbon monoxide level reach 400 parts per million by volume (PPM) or greater.

In case of a carbon monoxide alert, the pilot will receive an amber Alert annunciator light that is mounted on the Pilot's instrument panel on remote mounts and on the unit itself on the panel mount. The visual alert will remain until the carbon monoxide level is reduced below the alert level. The indicator is automatically reset when the CO level drops below 50 PPM. There is a three-minute delay at startup to stabilize the sensor before the unit will accurately sense CO levels.

The 353 and 353R have a built in pressure compensation sensor to detect cabin altitude changes up to 25,000 to give a better accuracy in CO Detection. These models also alarm if the cabin altitude goes above 10,000 feet for 10 seconds, 12,500 for 10 seconds and stays on over 14,000 feet. These models also have RS232 output for display data of CO Level on Garmin GNS480 and other manufacturers.

5.0 SERVICE FACILITIES (all models)

The operator can service all other components of the installation at an FAA certified Repair Station or by A&P mechanic. CO Detectors must me returned to CO Guardian for repair calibration or overhaul.

NOTE

The sensor requires special gases for testing. If any discrepancies are found with the unit during installation or during the operational service life, the unit must be returned to CO Guardian for repair or replacement. The CO Detector unit must be returned to the manufacturer for CO sensor replacement and re-calibration at the end of the service life applicable to the units part number.

6.0 INSTALLATION 353 using drawing (353-001 Rev. Orig or later)

The following documents the installation criteria of the Model 353 Carbon Monoxide Detector Installation (Panel Mount):

a. Choose a location behind the instrument panel for the installation of the CO Detector. Choose a location with space available that also meets the following criteria. A typical installation is shown in attached drawing. The unit can be installed on any side of the instrument panel.

b. Insure that the area around the CO Detector panel location will permit unrestricted airflow through the unit.

c. Install in a cockpit area not exposed to excessively dusty or dirty conditions.

d. Insure that the air intake on the front of the CO Detector is not obstructed in any manner.

e. Install the CO Detector in a location without high or disturbed airflow movement. The CO Detector will detect the presence of CO more effectively if the unit does not have air blowing over it.

f. Insure that the CO Detector installation area meets the temperature and humidity ranges listed in the List of Particulars specifications. Temperature and humidity conditions outside the specification may affect the sensitivity of the detector.

g. Install the TEST/RESET and the amber ALERT annunciator in a location within the pilot's direct field of vision and within normal pilot's reach. Note: see MFG MFD installation manual if TEST/RESET and the amber ALERT annunicator unit will not be installed and the data will be displayed thru the RS232 interface with MFD. See Manufacturers manuals for proper wiring guidance.

h. The remote unit can be remotely installed behind the instrument panel up to six inches from the panel air sampling holes. Verify there are no bends that may obstruct air flow to the unit.

i. The panel mount unit can be installed anywhere around the instrument panel within pilots reach. Verify that there is no obstruction of airflow to the unit.

j. INSTALLATION 353R using drawing (353-001 Rev. Orig or later)

6.1 Installation 353R using drawing 353-001 Rev. Orig or later

a. Choose a location behind the instrument panel for the installation of the CO Detector. Choose a location with space available that also meets the following criteria. A typical installation is shown in the attached drawing. The unit can be installed on any side of the instrument panel.

b. Insure that the area around the CO Detector panel location will permit unrestricted airflow through the unit.

c. Install in a cockpit area not exposed to excessively dusty or dirty conditions.

d. Insure that the air intake on the front of the CO Detector is not obstructed in any manner.

e. Install the CO Detector in a location without high or disturbed airflow movement. The CO Detector will detect the presence of CO more effectively if the unit does not have air blowing over it.

f. Insure that the CO Detector installation area meets the temperature and humidity ranges listed in the List of Particulars specifications. Temperature and humidity conditions outside the specification may affect the sensitivity of the detector.

g. Install the TEST/RESET and the amber ALERT annunciator in a location within the pilot's direct field of vision and within normal pilot's reach. Note: see MFG MFD installation manual if TEST/RESET and the amber ALERT annunicator unit will not be installed and the data will be displayed thru the RS232 interface with MFD.

6.2 RECOMMENDED INSTALLATION AREAS

- Typical installation areas are depicted below in Figurers 1, 2, 3, and 4.

FIGURE 1 - TYPICAL RIGHT HAND INSTRUMENT PANEL SHOWN

FIGURE 2 - TYPICAL PILOT INSTALLATION SHOWN

6.2.1 DB9 PINOUT INSTRUCTIONS

353 and 353R	
PIN	FUNCTION
1	14 or 28 VDC Power Input
2	Remote Test/Reset Switch
3	Remote Test/Reset Switch
4	CO Alert Relay
5	Power Ground
6	CO Alert Relay 2
7	RS232 TX Output
8	RS232 TX Input
9	Cabin Pressure Relay (optional)

CO DETECTOR CONNECTOR PINS AND FUNCTION

6.2.2 INSTALLATION CHECKS 353

a. With the CO Detector disconnected from the aircraft harness, conduct a continuity check of the added aircraft wiring.

b. Turn ON the aircraft Battery Switch. Close the CO DETECT circuit breaker and measure aircraft voltage between pins 1 and 5 of the CO Detector connector.

c. Connect the CO Detector connector to the aircraft harness. Turn aircraft Battery Switch ON. Close CO DETECT circuit breaker.

d. Operational check the unit by depressing the CO TEST/RESET switch and verifying the remote alert light operation. Remote Amber Alert light should flash twice.

e. Verify the unit can be shut off with the CO DETECT circuit breaker.

f. Determine the moment arm for the installed CO Detector location and record in aircraft weight and balance manual. CO Detector weight is 4.0 oz.

6.2.3 INSTALLATION CHECKS 353R

a. With the CO Detector disconnected from the aircraft harness, conduct a continuity check of the added aircraft wiring.

b. Turn ON the aircraft Battery Switch. Close the CO DETECT circuit breaker and measure aircraft voltage between pins 1 and 5 of the CO Detector connector. Pull the CO DETECT circuit breaker. Verify the voltage between pins 1 and 5 is OFF.

c. Close the CO DETECT KEEP ALIVE circuit breaker and measure aircraft voltage between pins 9 and 5 of the CO Detector connector. Turn aircraft Battery switch OFF. Measure aircraft voltage between pins 1 and 5 of the CO Detector connector.

d. Connect the CO Detector connector to the aircraft harness. Turn aircraft Battery Switch ON. Close CO DETECT circuit breaker.

e. Operational check the unit by depressing the CO Test/Reset switch and verifying the remote alert light operation if installed. Remote Amber Alert light should flash twice.

f. Verify the unit can be shut off with the CO DETECT circuit breaker.

g. Determine the moment arm for the installed CO Detector location and record in aircraft weight and balance manual. CO Detector weight is 3.5 oz.

7.0 MAINTENANCE INSTRUCTIONS (ALL MODELS)

The carbon monoxide detector and associated equipment consist of certain parts, which do not require periodic scheduled servicing or periodic scheduled preventive maintenance. At every power up the system will go through a self-diagnostic check.

WARNING: If all Models show a flashing remote Amber light every 4 seconds, return the unit to CO Guardian for repair or replacement. See MFG Manual if Remote light is displayed on the MFD.

Field repair or service is allowable on all of the installed system components except for the CO Detector Indicator itself. The CO Detector must be returned to CO Guardian, LLC for all service.

The aircraft wiring harness, circuit breaker, Alert annunciator, and Test/Reset switch shall be included maintenance instructions for general visual inspections for system integrity, installation security, corrosion and chaffing.

8.0 SCHEDULED MAINTENANCE

Scheduled Maintenance Program tasks to be added to the aircraft operator's appropriate airplane maintenance program are as follows:

	MAINTENANCE TASK	INTERVAL
a.	Recommended Periodic Scheduled Servicing Tasks:	None Required.
b.	Recommended Periodic Scheduled Preventative Maintenance test/checks to determine system condition and/or latent failures: **Note:** Be sure the vent on the faceplate is free of obstructions. Any failures of the system are evident to the pilot through a flashing remote Amber light approximately every 4 seconds.	Each time the unit is turned ON.
c.	Recommended Periodic Inspections:	None Required.
d.	Recommended Periodic Structural Inspections	None Required.
e.	Required CO Sensor replacement and calibration.	At end of Service Life (5 Years)

NOTE

The unit must be returned to the manufacturer for sensor replacement and recalibration at the end of the unit service life.

NO FIELD SERVICE OR OVERHAUL OF MODELS IS AUTHORIZED.

9.0 WEIGHT AND BALANCE / EQUIPMENT LIST (ALL MODELS)

The Aero 353's CO Detector installation weighs 0.125 lbs. Reference the aircraft weight and balance manual for moment arm.

10.0 LIMITATIONS (ALL MODELS)

The 353 family of Detectors may not replace any existing instrument or indicator required by the type design or operating limits.

11.0 NORMAL PROCEDURES 353

When the airplane master battery switch is selected ON, the Remote CO Detector goes through a self-test routine. The self-test checks for functionality of critical components such as the CO sensor, temperature sensor, pressure sensor, and integrity of the system and remote display will remain off if everything working properly. The RS232 MFD will show no CO on the CO Detector page.

11.1 NORMAL PROCEDURES 353R

You will notice the following test sequence:

- The Amber CO ALERT light will flash twice and then remain OFF until there is a CO ALERT, a failure of the unit, or another self-test is performed.

A self-test can be performed when desired by depressing the TEST/RESET button.

12.0 PERFORMANCE

No Change

13.0 EMERGENCY PROCEDURES

If the CO Detector ALERT annunciator activates in flight, press the TEST/RESET button to reset the alert annunciator. If the ALERT light continues to illuminate:

- Shut off the heater, air conditioning or any other opening to the engine compartment.
- Open a fresh air source immediately.
- Don't smoke.
- Use 100% oxygen, if possible.
- Land as soon as conditions permit.
- Be sure the source of the contamination is corrected before further flight.

NOTE: The remote Amber light will stay on until the CO level goes below 50 parts per million (PPM) by volume of carbon monoxide concentration. SEE MFD manual if the "ALERT" display is integrated with the Manufacturers MFD.

DO not recycle the unit through the circuit breaker. A three-minute delay is required for the CO sensor to stabilize after each power-up in the -001 through -004 P/N units.

14.0 UNIT FAILURE INDICATION:

A failure of the CO Sensor, Temperature Sensor, or the Micro-controller will result in the following failure indications:

- The remote Amber light will flash at an approximate rate of one flash each four (4) seconds until the failure is cleared or power is removed from the unit. NOTE: SEE MFG manual if the fault data is integrated with the MFG MFD for fault analysis.

In case of a failure indication, attempt to clear the failure condition by resetting the CO Detector. Should the failure condition continue, remove the CO Detector power by pulling the CO Detector circuit breaker.

15.0 RS-232 DATA BUSS OPTION

The RS-232 Data Buss option is currently available on numerous MFD units. The RS-232 data buss output will couple CO Detector status information to electronic display systems with RS-232 input capability.

See Multi-Function display manufacturers Installation Manual for interface guidance. The CO ALERT can be reset through the RS-232 interface provided the Multi-Function system contains the reset capability.

16.0 Warranty

WARRANTY COVERAGE: CO GUARDIAN LLC. WARRANTS TO THE ORIGINAL CONSUMER PURCHASER, THAT THIS DETECTOR WILL BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM DATE OF PURCHASE. THE MANUFACTURER'S LIABILITY HEREUNDER IS LIMITED TO REPLACEMENT OF THE PRODUCT, REPAIR OF THE PRODUCT OR REPLACEMENT OF THE PRODUCT WITH A REPAIRED PRODUCT AT THE DISCRETION OF THE MANUFACTURER. THIS WARRANTY IS VOID IF THE PRODUCT HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLECT, TAMPERING OR OTHER CAUSES NOT ARISING FROM DEFECTS IN MATERIAL OR WORKMANSHIP. THIS WARRANTY EXTENDS TO THE ORIGINAL CONSUMER PURCHASER OF THE PRODUCT ONLY.

Warranty Disclaimers: Any implied warranties arising out of this sale, including but not limited to the implied warranties of description, merchantability and fitness for a particular purpose, are limited in duration to the above warranty period. In no event shall the Manufacturer be liable for loss of use of this product or for any indirect, special, incidental or consequential damages, or costs, or expenses incurred by the consumer or any other user of this product, whether due to a breach of contract, negligence, strict liability in tort or otherwise. The manufacturer shall have no liability for any personal injury, property damage or any special, incidental, contingent or consequential damage of any kind resulting from gas leakage, fire or explosion.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Some states do not allow the exclusion or limitation of consequential or incidental damages, so the above limitations or exclusions may not apply to you.

Legal Remedies: This warranty gives you specific legal rights and you may also have other rights that vary from state to state.

Warranty Performance: During the above warranty period, your product will be replaced with a comparable product if the defective product is returned, postage prepaid, to CO Guardian, Customer Service Department, 1951 East Airport Drive, Tucson, AZ 85706, together with proof of purchase date. Please include a note describing the problem when you return the unit. The replacement product will be in warranty for the remainder of the original warranty period or for six months whichever is longer. Other than the cost of postage, no charge will be made for replacement of the defective product.

Important: Do not attempt to open unit. If unit is opened, warranty will be void.

Your Carbon Monoxide Alarm is not a substitute for property, disability, life or other insurance of any kind. Appropriate insurance coverage is your responsibility. Consult your insurance agent.

NOTE

The warranty will be void if the unit is opened or tampered with